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L1: Entry 1 of 4

File: USPT

Jan 10, 1995

US-PAT-NO: 5380889

DOCUMENT-IDENTIFIER: US 5380889 A

TITLE: Method of forming resist pattern and organic silane compound for forming anti-reflection film for use in such method

DATE-ISSUED: January 10, 1995

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|--------------------|-------|-------|----------|---------|
| Hanawa; Tetsuro | Hyogo | | | JP |
| Op de Beeck; Maria | Hyogo | | | JP |

ASSIGNEE-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY | TYPE CODE |
|-----------------------------------|-------|-------|----------|---------|-----------|
| Mitsubishi Denki Kabushiki Kaisha | Tokyo | | | JP | 03 |

APPL-NO: 07/ 814632

DATE FILED: December 30, 1991

FOREIGN-APPL-PRIORITY-DATA:

| COUNTRY | APPL-NO | APPL-DATE |
|---------|----------|----------------|
| JP | 3-199603 | August 8, 1991 |

INT-CL: [06] C07 F 7/10

US-CL-ISSUED: 556/410; 549/214, 528/25, 528/29, 528/129, 528/211

US-CL-CURRENT: 556/410; 430/272.1, 528/129, 528/211, 528/25, 528/29, 549/214

FIELD-OF-SEARCH: 556/410, 549/214, 528/25, 528/29, 528/129, 528/211

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

| PAT-NO | ISSUE-DATE | PATENTEE-NAME | US-CL |
|----------------|---------------|-----------------|-----------|
| <u>4623739</u> | November 1986 | Watanabe et al. | 556/410 |
| <u>4981986</u> | January 1991 | Yoshioka et al. | 556/410 |
| <u>5118724</u> | June 1992 | Frances et al. | 556/410 X |
| <u>5162559</u> | November 1992 | Wilharm et al. | 556/410 X |

FOREIGN PATENT DOCUMENTS

| | | | |
|----------------|---------------|---------|-------|
| FOREIGN-PAT-NO | PUBN-DATE | COUNTRY | US-CL |
| 3036710 | May 1982 | DE | |
| 3627757 | February 1988 | DE | |
| 3842896 | November 1989 | DE | |

ART-UNIT: 124

PRIMARY-EXAMINER: Shaver; Paul F.

ABSTRACT:

An organic silane compound for forming an antireflection film on the surface of a substrate prior to forming a resist pattern includes a silicon atom, a leaving group bound to the silicon atom and capable of reacting with a hydroxyl group existing in the surface of the semiconductor substrate to form a covalent bond between the semiconductor substrate and the organic silane compound, and a substituent group capable of absorbing far-ultra violet light. The substrate is coated with the organic silane compound. Resist is applied onto the substrate coated with the organic silane compound. The resist is exposed selectively using far-ultra violet light. The resist is exposed.

8 Claims, 33 Drawing figures

| | | | | | | | | | | | | | |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|-------|-----------|-------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | 130MC | Dram Desc | Image |
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☐ 2. Document ID: US 5380621 A

L1: Entry 2 of 4

File: USPT

Jan 10, 1995

US-PAT-NO: 5380621

DOCUMENT-IDENTIFIER: US 5380621 A

TITLE: Mid and deep-UV antireflection coatings and methods for use thereof

DATE-ISSUED: January 10, 1995

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|--------------------------------|------------------|-------|----------|---------|
| Dichiara; Robert R. | Middletown | NY | | |
| Lyons; Christopher F. | LaGrangeville | NY | | |
| Sooriyakumaran; Ratnasabapathy | Fishkill | NY | | |
| Spinillo; Gary T. | Wappingers Falls | NY | | |
| Welsh; Kevin M. | Fishkill | NY | | |
| Wood; Robert L. | Poughkeepsie | NY | | |

ASSIGNEE-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY | TYPE | CODE |
|---|--------|-------|----------|---------|------|------|
| International Business Machines Corporation | Armonk | NY | | | | 02 |

APPL-NO: 08/ 055400

DATE FILED: May 3, 1993

PARENT-CASE:

This application is a continuation of U.S. Ser. No. 07/845,404 filed Mar. 03, 1992, and entitled "Mid and Deep-UV Antireflection Coatings and Methods For Use Thereof, "

now abandoned.

INT-CL: [06] G03 C 1/492

US-CL-ISSUED: 430/272; 430/270, 522/6, 522/904

US-CL-CURRENT: 430/272.1; 430/270.1, 522/6, 522/904

FIELD-OF-SEARCH: 430/272, 430/270, 522/6, 522/904

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

| PAT-NO | ISSUE-DATE | PATENTEE-NAME | US-CL |
|----------------|---------------|-------------------|---------|
| <u>4137365</u> | January 1979 | Wydeven et al. | 428/412 |
| <u>4491628</u> | January 1985 | Ito et al. | 430/176 |
| <u>4515886</u> | July 1985 | Yamaoka et al. | 430/270 |
| <u>4529685</u> | July 1985 | Borodovsky et al. | 430/311 |
| <u>4587203</u> | May 1986 | Brault et al. | 430/325 |
| <u>4623609</u> | November 1986 | Harita et al. | 430/325 |
| <u>4746596</u> | May 1988 | Yoshioka et al. | 430/325 |
| <u>4758305</u> | July 1988 | Bonifield et al. | 156/643 |
| <u>4761464</u> | August 1988 | Zeigler et al. | 528/30 |
| <u>4782009</u> | November 1988 | Bolon et al. | 430/326 |
| <u>4855199</u> | August 1989 | Bolon et al. | 430/18 |
| <u>4871646</u> | October 1989 | Hayase et al. | 430/192 |
| <u>4910122</u> | March 1990 | Arnold et al. | 430/313 |

OTHER PUBLICATIONS

Zhang et al "Organosilane Polymers:--Diphenylsilylene--". Journal of Polymer Science, Polymer Letters Ed. vol. 23, No. 9. Sep. 1985. pp. 479-485.
R. West, "The Polysilane High Polymers", J. Organometallic Chem., 300, 327 (1986).

ART-UNIT: 157

PRIMARY-EXAMINER: McCamish; Marion E.

ASSISTANT-EXAMINER: Chapman; Mark A.

ABSTRACT:

An antireflective coating composition (ARC) for use with chemically amplified photoresist compositions comprising a polymer composition which is highly absorbent to mid and deep UV radiation, which is substantially inert to contact reactions with a chemically amplified photoresist composition, and which is insoluble in the developer for the chemically amplified photoresist composition.

7 Claims, 1 Drawing figures

Full Title Citation Front Review Classification Date Reference Sequences Attachment: F00C Draw Desc Image

☐ 3. Document ID: US 5234990 A

L1: Entry 3 of 4

File: USPT

Aug 10, 1993

US-PAT-NO: 5234990

DOCUMENT-IDENTIFIER: US 5234990 A

TITLE: Polymers with intrinsic light-absorbing properties for anti-reflective coating applications in deep ultraviolet microlithography

DATE-ISSUED: August 10, 1993

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|----------------------|-----------|-------|----------|---------|
| Flaim; Tony | St. James | MO | | |
| Lamb, III; James | Rolla | MO | | |
| Moeckli; Kimberly A. | Salem | MO | | |
| Brewer; Terry | Rolla | MO | | |

ASSIGNEE-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY | TYPE CODE |
|----------------------|-------|-------|----------|---------|-----------|
| Brewer Science, Inc. | Rolla | MO | | | 02 |

APPL-NO: 07/ 835715

DATE FILED: February 12, 1992

INT-CL: [05] C08J 3/00, C08K 5/36, C08L 81/00

US-CL-ISSUED: 524/609; 524/612, 524/220, 524/376, 524/221, 524/233, 524/241, 524/261, 524/284, 524/726, 524/731, 524/755, 524/770, 524/773

US-CL-CURRENT: 524/609; 430/271.1, 524/220, 524/221, 524/233, 524/241, 524/261, 524/284, 524/376, 524/612, 524/726, 524/731, 524/755, 524/770, 524/773

FIELD-OF-SEARCH: 524/609, 524/612, 524/376, 524/220, 524/221, 524/233, 524/241, 524/261, 524/284, 524/726, 524/731, 524/755, 524/770, 524/773, 528/491, 528/492, 528/493, 528/494, 528/495, 430/312, 430/313

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

| PAT-NO | ISSUE-DATE | PATENTEE-NAME | US-CL |
|----------------|--------------|------------------|---------|
| <u>4910122</u> | March 1990 | Arnold et al. | 430/313 |
| <u>4950583</u> | August 1990 | Brewer et al. | 430/311 |
| <u>5057399</u> | October 1991 | Flaim et al. | 430/313 |
| <u>5110697</u> | May 1992 | Lamb, III et al. | 430/14 |

FOREIGN PATENT DOCUMENTS

| FOREIGN-PAT-NO | PUBN-DATE | COUNTRY | US-CL |
|----------------|---------------|---------|-------|
| 0257255 | February 1988 | EP | |

OTHER PUBLICATIONS

Ting and Liauw, "An improved Deep Ultraviolet (DUV) Multilayer Resist Process for High Resolution Lithography", SPIE Proceedings, vol. 469, p. 24 (1984).
M. A. Listvan et al., "Multiple Layer Techniques in Optical Lithography: Applications to Fine Line MOS Production", SPIE vol. 470, p. 85 (1984).
Legenza et al., "A New Class of Bilevel and Mono-level Positive Resist Systems Based on a Chemically Stable Imide Polymer", SPIE Proc., vol. 539, p. 250 (1985).
A. Jeffries et al., "Two Anti-Reflective Coatings for Use Over Highly Reflective Topography", SPIE Proceedings, vol. 539, p. 342 (1985).
W. Ishii et al., "Anti-Reflective Coating Material for Highly Reflective Surfaces

with Topography", SPIE vol. 631, p. 295 (1986).

T. Tanaka et al., "A New Photolithography Technique with Antireflective Coating on Resist: ARCOR", J. Electrochem. Soc., vol. 137, p. 3900 (1990).

A. Yen, "Fabrication of Large-Area 100 nm-Period Gratings using Achromatic Holographic Lithography", (1991).

ART-UNIT: 151

PRIMARY-EXAMINER: Michl; Paul R.

ASSISTANT-EXAMINER: Rajguru; U. K.

ABSTRACT:

A composition and a method for forming an anti-reflective layer for DUV microlithographic processes is disclosed. The compositions of the present invention includes a polymer dissolved in a suitable solvent. The polymers are polysulfone and polyurea polymers which possess inherent light absorbing properties at deep ultraviolet wavelengths. In accordance with the method of the present invention, these compositions are applied to a substrate to form an anti-reflective coating, and thereafter a photoresist material that is compatible with the anti-reflective coating is applied.

6 Claims, 0 Drawing figures

| | | | | | | | | | |
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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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☐ 4. Document ID: US 5110502 A

L1: Entry 4 of 4

File: USPT

May 5, 1992

US-PAT-NO: 5110502

DOCUMENT-IDENTIFIER: US 5110502 A

TITLE: Method of suppressing formation of contrails and solution therefor

DATE-ISSUED: May 5, 1992

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|---------------|---------------|-------|----------|---------|
| Singh; Surjit | Williamsville | NY | | |

ASSIGNEE-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY | TYPE CODE |
|--------------|---------------|-------|----------|---------|-----------|
| SCIPAR, Inc. | Williamsville | NY | | | 02 |

APPL-NO: 07/ 234911

DATE FILED: August 22, 1988

PARENT-CASE:

This is a division of application Ser. No. 813,098 filed Dec. 24, 1985 now U.S. Pat. No. 4,766,725.

INT-CL: [05] B01D 17/02, C09K 3/18

US-CL-ISSUED: 252/319; 523/138

US-CL-CURRENT: 516/114; 523/138

FIELD-OF-SEARCH: 252/358, 252/321, 252/319, 252/70, 252/DIG.14, 239/8, 523/138,

60/204, 60/264, 60/273, 60/282

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

| PAT-NO | ISSUE-DATE | PATENTEE-NAME | US-CL |
|----------------|----------------|--------------------|---------|
| <u>2835530</u> | May 1958 | Schneider | 239/2.1 |
| <u>2908442</u> | October 1959 | Stone | 239/2 |
| <u>2962450</u> | November 1960 | Elod et al. | 252/319 |
| <u>3096290</u> | July 1963 | Duane et al. | 252/70 |
| <u>3289409</u> | December 1966 | Schirmer | 60/205 |
| <u>3429507</u> | February 1969 | Jones | 239/2 |
| <u>3517505</u> | June 1970 | Anderson et al. | 60/39.5 |
| <u>3517512</u> | June 1970 | Anderson et al. | 60/264 |
| <u>3537900</u> | November 1970 | Halbert | 134/42 |
| <u>3608810</u> | September 1971 | Kooser | 239/2 |
| <u>3608820</u> | September 1971 | Kooser | 239/2 |
| <u>3630913</u> | December 1971 | Scott, Jr. et al. | 252/70 |
| <u>3647710</u> | March 1972 | Stange | 252/319 |
| <u>3722815</u> | March 1973 | Moore | 239/2 |
| <u>3802624</u> | April 1974 | Kuhne et al. | 239/2 |
| <u>3804328</u> | April 1974 | Lane et al. | 239/2 |
| <u>4176790</u> | December 1979 | Osorio | 239/2 |
| <u>4335980</u> | June 1982 | DePriester | 405/217 |
| <u>4358389</u> | November 1982 | Konig-Lumer et al. | 252/70 |
| <u>4362271</u> | December 1982 | Montmory | 239/2 |

ART-UNIT: 123

PRIMARY-EXAMINER: Ivy; C. Warren

ASSISTANT-EXAMINER: Scalzo; Catherine S. Kilby

ABSTRACT:

A solution for suppressing the formation of contrails from the exhaust of an engine including by weight between about 0.01% to 2.5% of the non-corrosive surfactant, between about 1% and 8% water, and between about 85% and 99% ethylene glycol. Another solution may include by weight a monohydric, dihydric or polyhydric alcohol in an amount of between about 85% and 99% and the non-corrosive surfactant in an amount of between about 0.01% and 8%. Still another solution may include an inorganic nucleating or hygroscopic salt, such as ammonium iodide, ammonium fluoride, silver iodide or calcium chloride in monohydric, dihydric or polyhydric alcohols and surfactant mixtures. Yet another solution may include an inorganic salt in monohydric, dihydric or polyhydric alcohols.

26 Claims, 0 Drawing figures

| | | | | | | | | | |
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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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